

Aspectos indicativos de envelhecimento facial precoce em respiradores orais adultos*****

Indicative factors of early facial aging in mouth breathing adults

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*****Pesquisa Realizada na Universidade Estadual de Ciências da Saúde de Alagoas.

Artigo de Pesquisa

Artigo Submetido a Avaliação por Pares

Conflito de Interesse: não

Recebido em 23.08.2006.

Revisado em 31.05.2007; 23.07.2007.

Aceito para Publicação em 23.07.2007.

Abstract

Background: early facial aging in mouth breathing adults. Aim: to verify the presence of indicative factors of early facial aging and to characterize the measurements of the projection of the nasogenian fold to the tragus and of the face width in mouth and nose breathing adults. Method: aspects of early facial aging were observed in 60 individuals (presence of dark circles and wrinkles under the eyes, mental wrinkles and mental ridges). Measurements of the projection of the nasogenian fold to the tragus and of the face width (distance between the buccinators) were taken using a digital caliper. Later, the volunteers were submitted to speech-language evaluations (anamneses and orofacial myofunctional assessment) and to an otolaryngology inspection in order to establish the diagnosis of mouth breathing (anamneses, clinical evaluation and video laryngoscopy). The obtained data were analyzed according to descriptive statistics and to the following statistic tests: Kolmogorov-Smirnov, Shapiro-Wilk, Quisquare, Mann-Whitney and the T-Student test for independent variables. Differences were considered significant when the p value was inferior to .05 and the accepted beta error was of .1. Results: the research sample consisted only of female volunteers. For the research group (mouth breathers) the age average was of 22.04 ± 2.25 years and, for the control group (nose breathers) the age average was of 21.94 ± 2.03 years. The presence of a high percentage of indicative factors of early facial aging was observed for the group of mouth breathers when compared to the group of nose breathers. Greater differences between the projections of the nasogenian ridges in right and left side of the face was also observed for the group of mouth breathers. However, higher values of face widths were observed for the nose breathing individuals, configuring a discreetly more widened face in the cheek region. Conclusions: in the present study there was a higher indication of early facial aging for the group of mouth breathers.

Key Words: Aging; Face; Mouth Breathing.

Resumo

Tema: envelhecimento facial precoce em respiradores orais adultos. Objetivo: verificar a presença de aspectos indicativos de envelhecimento facial precoce e caracterizar morfometricamente as medidas da projeção do sulco nasogeniano ao tragus e da largura facial (distância entre os bucinadores) em respiradores orais e nasais adultos. Método: foi realizada, em 60 indivíduos, observação de aspectos indicativos de envelhecimento facial precoce (presença de olheiras, rugas embaixo dos olhos, rugas mentuais e sulco mental). Em seguida, foram tomadas medidas da projeção do sulco nasogeniano ao tragus e da largura facial (distância entre os bucinadores) utilizando-se paquímetro eletrônico digital. Posteriormente, os voluntários foram submetidos às avaliações fonoaudiológica (anamnese e avaliação miofuncional orofacial) e otorrinolaringológica (anamnese, avaliação clínica e exame de videonasofaringolaringoscopia) para diagnóstico da respiração oral. Após os dados obtidos serem caracterizados com a utilização de técnicas de estatística descritiva, aplicou-se os testes de aderência de Kolmogorov-Smirnov e Shapiro-Wilk e os testes de hipótese Qui-quadrado, Mann-Whitney e o teste T de Student para variáveis independentes. As diferenças foram consideradas significativas para valores de p menores que 0,05 e o erro beta admitido foi de 0,1. Resultados: a amostra foi composta apenas por voluntários do sexo feminino. Verificou-se, no grupo teste (respiradores orais), média de idade de $22,04 \pm 2,25$ anos e, no grupo controle (respiradores nasais), $21,94 \pm 2,03$ anos. Observou-se, no grupo de respiradores orais, um percentual mais elevado da presença de aspectos indicativos de envelhecimento facial precoce quando comparado aos respiradores nasais, bem como maiores diferenças entre as projeções dos sulcos nasogenianos nas hemifaces direita e esquerda. Entretanto, foram observados maiores valores de largura facial nos respiradores nasais, configurando faces discretamente mais alargadas na região das bochechas. Conclusão: no presente estudo foram observados maiores indícios de envelhecimento facial precoce no grupo de respiradores orais.

Palavras-Chave: Envelhecimento; Face; Respiração Bucal.

Referenciar este material como:

OLIVEIRA, A. C.; ANJOS, C. A. L.; SILVA, E. H. A. A.; MENEZES, P. L. Indicative factors of early facial aging in mouth breathing adults (original title: Aspectos indicativos de envelhecimento facial precoce em respiradores orais adultos). *Pró-Fono Revista de Atualização Científica*, Barueri (SP), v. 19, n. 3, p. 305-312, jul.-set. 2007.

Introduction

Nasal breathing, which is natural and elementary from birth, provides favorable conditions for the adequate growth and development of hard and soft orofacial tissue, promoting facial harmony and balance (Ribeiro et al, 2002; Carvalho, 2003).

Mouth breathing is an adaptive function that occurs when there is an impediment to nasal breathing. It is defined as a syndrome which causes countless disturbances for the individual and can be either organic or functional in origin. The former occurs in the case of a mechanical obstacle to breathing and the latter where the airways are permeable.

Organic respiratory insufficiency can be caused by mechanical obstructions in the internal nasal cavities, conchae, rhinopharynx or the oral cavity. Among the organic factors, the most common are: hypertrophy of the pharyngeal and palatinal tonsils, deviation of the nasal septum, hypertrophy of the turbinal bones, chronic pharyngitis and allergic rhinitis.

Casanova (2004) and Tessitore (2004) cite the causes of functional oral respiration as flaccidness of the orofacial musculature, hyperfunction of the elevating muscles of the jaw, a short or incompetent upper lip and an enlarged tongue.

The mouth breather may display innumerable characteristics, among these: craniofacial growth with vertical predominance, reduction of the tonus, hyperfunction of the lips and cheeks, retracted or shortened upper lip and lower lip with eversion or obstruction between the teeth; shadows under the eyes (infraorbital cyanosis) with asymmetry in eye positioning; sleep alteration, insomnia and frequent fatigue and hypercontraction of the mental muscle (Tallgren et al., 1998; Vig, 1998; Di Francesco, 1999; Marins, 2001; Junqueira et al., 2002; Paulo and Conceição, 2003; Burger et al., 2004; Tessitore, 2004; Mekhitarian et al., 2005; Rodrigues et al., 2005; Lessa et al., 2005).

Parolo and Bianchini (2000) and Tessitore (2004) further mention the presence of facial asymmetry alterations in expressive facial mimicry, ill-configured or tense nasogenal sulcus and reduced facial tonus.

The reduction of tonus in the facial muscles, especially the major and minor buccinators and zygomas, form what is known as facial flaccidity, causing low facial resistance to tension, with a 'collapsed face' appearance and producing premature aging (Jardini, 2001; Jardim, 2002; Tasca, 2002).

There are three factors capable of causing alterations in the tonus of facial musculature: the aging process; alterations in the orofacial functions and respiratory and postural irregularities. Therefore, facial flaccidity is not exclusively related to the loss of muscle tonus during the aging process and can be present in children, young people and adults, in addition to the elderly. (Oliveira e Vieira, 1999; Tasca, 2002).

The buccinator is a mimic muscle responsible for the facial flaccidity present in mouth breathers (Marchesan, 1993) and directly related to the signs of aging. This muscle confers the facial image of the individual since it is situated in the centre of each facial hemisphere, proportioning balance and symmetry (Méndez et al., 2004; Jardim, 2005; Jardim et al., 2006).

Evidence of premature ageing is more obvious in the face than other areas of the body, since it is the location of numerous muscles with different functions, favoring premature wrinkling (Pierotti, 2004). These muscles, especially those responsible for facial expression, do not have facial sheaths, a characteristic of skeletal muscles, and are situated just below the skin, forming a layer which is almost unique. In this way, their contraction moves the cutis, provoking depressions characterized by lines or creases perpendicular to the direction of the muscle fibers which, in time and with the repetition of these movements, form wrinkles (Madeira, 2003).

Wrinkles, grooves or creases in the skin, are caused by a reduction in the deepest fat layers, the size of cells that make up the dermis and their hydric content, and by alterations in collagen and the elastic fibers (Tasca, 2002).

Among the determining factors for the appearance of wrinkles are: genetics; heredity; sun exposure; smoking or cigarette smoke; environmental toxins; inadequate diet (primarily a lack of vitamins A, C, E and folic acid) with a high percentage of fat/salt; low hydration; excessive consumption of alcohol; stress; sleep deprivation, as well as the natural aging process (Perricone, 2001; Velasco et al., 2004).

Besides these elements, the repetitive movements made by these individuals in the realization of stomatognathic functions can cause the appearance of these expression wrinkles. When these functions are balanced, the repetition of these movements can be inoffensive for a certain period, creating only transitory wrinkles. However, when performed inadequately, for a prolonged period

and with abusive use of the musculature, these movements can prematurely shape what are known as permanent expression wrinkles (Franco e Scattone, 2002; Takacs et al., 2002; Madeira, 2003; Ulson, 2003).

According to Ulson (2003) and Franco (2005), nasogen folds are caused by the exaggerated contraction of the facial muscles when performing stomatognathic functions, fatigue and lack of sleep. These sleep disturbances, very common among mouth breathers, also cause dark circles and wrinkles under the eyes.

The practice of phonoaudiology in facial esthetics can prevent or reduce the appearance of expression wrinkles through the balance of stomatognathic functions and the relaxation of facial musculature. With this professional intervention, we observe the reduction of nasogen folds, dark shadows, flaccidness of the cheeks and wrinkles under the eyes, as well as a relaxed, rested and serene face with more defined lips and a change in posture (Franco e Scattone, 2002; Takacs et al., 2002; Ulson, 2003; Pierotti, 2004).

Thus, as a result of the countless alterations caused by mouth breathing and considering its influence on facial ageing, the main objective of this study was to verify the existence of indicators of premature facial ageing with the specific aim of the morphometric characterization of the degree of prominence of the nasogen sulcus to the tragus and facial width (distance between the buccinators) in mouth and nasal breathers.

Method

The protocol of this study is based on current legislation, Resolution No 196/96, of the National Health Council, of the Ministry of Health, for studies with human beings and was approved by the Research Ethics Committee of the Alagoas State University of Health Sciences - UNCISAL, protocol n° 453.

Sample

The sample consisted of 60 individuals, allocated to two groups according to the presence/absence of mouth breathing. The control group was composed of 23 individuals with diagnosis of nasal breathing through phonoaudiology and otorhinolaryngology; and the test group of 37 volunteers, diagnosed as mouth breathers.

The following inclusion criteria were used: a) age between 20 and 30 years; b) normal weight [Body Mass Index (BMI) index between 18.5 and 25, WHO - World Health Organization Obesity (1998)]. Exclusion criteria were: a) plastic surgery and/or other methods of softening facial wrinkles; b) neurological problems; c) neuromuscular disorders d) prior (up to six months previously) speech therapy treatment in vocal motricity; e) albinism or black skin; f) presence of three or more dental imperfections; with only extraction or congenital agenesis of the third upper and lower molars accepted, as long as these were not adjacent, in order to avoid impairment of the musculature and mucous of the cheeks.

Procedures for data collection

Initially, a selection questionnaire was applied, followed by the reading of the "Consent Form", verbally explained and then signed by the subjects who agreed to participate in this study.

Thereafter, an observation was performed of indicators of premature facial ageing (presence of dark shadows, wrinkles beneath the eyes, mental folds and wrinkles) and faces were photographed (front, left and right profiles) using an Olympus Digital Camera C - 4040 (CCD sensor with 4,1 megapixels; optic zoom 3x 38mm - 114mm; 12x total precision zoom, of these 3x optical and 4x digital)

Facial measurements were then obtained using a Vonder electronic Digital Pachymeter, with a resolution of 0.01 mm/0.005" and precision of 150mm/6". In order to measure the prominence of the nasogen sulcus to the tragus, the methodology adopted by Paes (2004) was used, as shown in Figures 1 and 2. Furthermore, the distance was measured between the buccinator muscles (facial width) as proposed by Jardini (2005) (see Figures 3 and 4). In the anthropometric analysis of the face, three measurements per subject were taken, in order to achieve an average value.

Volunteers then underwent an otorhinolaryngological and speech-audiological evaluation for the diagnosis of mouth breathing. The case history and speech therapy evaluation (orofacial myofunction) were performed by a speech therapist at the Laboratory of Instrumentation and Acoustics - LIA at UNCISAL. The otorhinolaryngological analysis was performed by an otorhinolaryngologist at the Otorhinolaryngology Clinic at the same institution and was made up of the case history, clinical evaluation and the nasopharyngoscopy.

Data Analysis

Since the objective of this study was not to generalize the findings, calculations of sample size were not performed. However, 30 volunteers were selected, by group, to increase the probability of the use of parametric tests (Doria Filho, 2003). Additionally, adherence tests by Kolmogorov-Smirnov and Shapiro-Wilk were applied, to verify the normality of the sample.

The data were tabulated and processed to a microcomputer, version SPSS 13.0. Data is reported

using tables and charts of the means, standard deviations and percentages.

After characterizing the data using techniques of statistical description, we applied the chi-square or Mann-Whitney tests to compare variables without normal distribution, depending on whether these were nominal or ordinal. The Student's t-test was used to verify the differences between the variables with normal distribution. Amounts were considered significant for p less than 0.05 ($p < 0.05$). The beta error value allowed was 0.1.

FIGURE 1. Prominence of the nasogenal sulcus measurement.



FIGURE 2. Prominence of the nasogenal sulcus to the tragus measurement.



FIGURE 3. Localization of the buccinator muscles point.



FIGURE 4. Measurement between the buccinator muscles (facial width).



Results

The sample studied consisted of 60 women volunteers, 23 (38.3%) from the control group (nasal breathers), and 37 (61.66%) from the test group (mouth breathers). The test group had an age range of 20 to 30 years, mean age of 22.04 and standard deviation of 2.25. The control group, with varying ages between 20 and 28 years, had a mean age of 21.94 years and standard deviation of 2.03.

The normality of the samples was observed using the Shapiro-Wilk and Kolmogorov-Smirnov tests; however normal distribution was only verified in the following variables: quantity of indicators of premature facial ageing, facial width (distance between the buccinators) and the measurements of the prominence of the nasogenal sulcus to the tragus (test group). Consequently, parametric tests were used for these variables and non-parametric tests for the non-homogenic variables.

The study showed a higher percentage of indicators of premature facial ageing in the mouth breathing group than in nasal breathers, as shown in graph 1.

The chi-square test was used to analyze which signs of premature facial ageing could actually be considered present in each group. Thus, it can be confirmed that for the mouth breathing group, dark shadows, wrinkles under the eyes and mental folds are significantly apparent. While for the group of nasal breathers, none of these signs are significantly present. (table 1).

The chi-square test also showed that the nasal breathers do not display mental wrinkles, with a value of p less than 0.001. However, among the mouth breathers, no significant evidence of these wrinkles was found ($p=0,071$).

The test group also had a higher average amount of premature facial ageing indicators per person (3.43) than the control group (2.17). Student's t-test confirmed the difference between the two means, and found a significant p value of 0.03.

Analysis of the distance between the buccinators (facial width) showed that the control group had a mean facial width of 107.96mm whereas for the test group it was 106.48mm, meaning that the nasal breathers had faces which were slightly wider in the cheek area. However, student's t-test showed no significant difference between the two groups ($p = 0.111$).

As can be observed in table 2, mean dimensions of prominence of the nasogenal sulcus to the tragus were larger in nasal breathers, on the left and right facial hemispheres, than in the mouth breathers. To obtain this figure, the student's t-test was applied in the group of mouth breathers ($p = 0.747$), while the Mann-Whitney Test was used for the nasal breathers ($P=0.362$), with no statistically significant differences observed.

In relation to the measurements of the prominence of the nasogenal sulcus to the tragus, there were higher differences in value (modulation) between the right and left sides in the test group (mean = 5.15mm) than in the control group (mean = 3.87mm). When comparing the two groups using the Mann-Whitney test, no significant differences were found ($p = 0.167$).

GRAPH 1. Indicators of premature facial ageing.

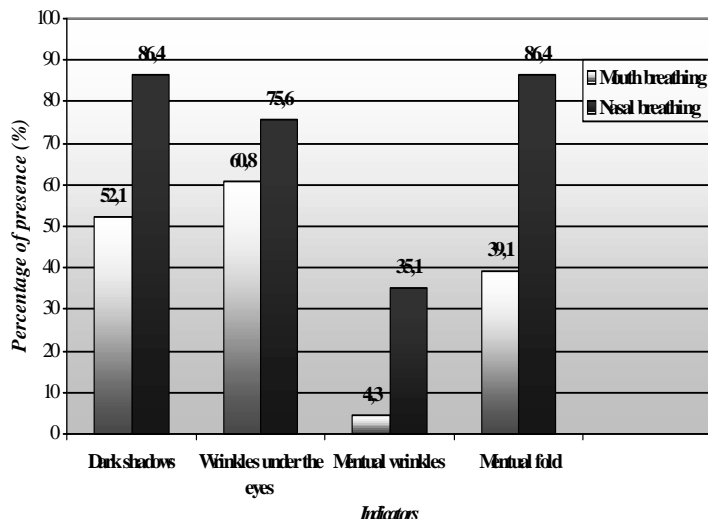


TABLE 1. Presence of Indicators of premature facial ageing.

Chi-Square test		
	Significance (p)	
	Nasal breathing	Mouth breathing
Dark shadows	0,835	0,002
Wrinkles under the eyes	0,297	<0,001
Mental fold	0,297	<0,001

Discussion

Discussion of the methods

The decision was taken to use only women in this study, in order to avoid interference in the results caused by differences between the sexes in relation to the quantity of muscle fibers and the natural process of facial ageing. (Jardini, 2005).

In relation to age, the sample should consist of subjects between the ages of 20 and 30 years, as this age range can be fitted into a single group with regard to neuromuscular appearance, and also because the first signs of premature facial ageing appear from the age of 30 (Pierotti, 2004; Jardim, 2005). Thus, we aimed at discarding any aspects relative to the natural ageing process.

Indicators of premature facial ageing were considered to be facial expression wrinkles, pronounced nasogen folds and facial flaccidity. However, among these wrinkles, only those which displayed a relation to mouth breathing, such as wrinkles under the eyes and mental wrinkles, were analyzed (Pierotti, 2004; Franco, 2005).

In addition, the presence of dark shadows was confirmed, since sleep alterations are very frequent in mouth breathers (Di Francesco, 1999; Mitre, 2003; Burger et al., 2004; Mekhitarian et al., 2005). These wrinkles form a face with a tired appearance, which is considered by Franco (2005) as a sign of facial ageing.

In relation to indicators of facial ageing, the presence of mental folds was also examined. These are considered to be gravitational wrinkles and are directly related to eversion of the lower lip and the intense contraction of the mental muscle, common characteristics in mouth breathers. (Ulson, 2003; Franco, 2005).

For analysis of facial morphology, anthropometry was also used. This offers countless advantages, its simplicity making it an important clinical instrument, and provides reference data on normality for a large variety of facial measurements. However, some factors can interfere in the accuracy of these measurements, such as: distances lower than 2 or 3 cm, subjective location of distances to be measured and the taking of only one measurement (Budai et al., 2003).

Consequently, in order to avoid any interference, the measurements followed the methodology used in previous investigations (Paes, 2004; Jardim, 2005), where points of easily

TABLE 2. Dimensions of prominence of the nasogen sulcus to the tragus in mouth and nasal breathing (mm).

	Nasal breathing		Mouth breathing	
	Right side	Left side	Right side	Left side
Mean	96,92	98,64	96,53	95,64
Standard deviation	5,96	5,80	7,62	5,99

visualized demarcation were determined, providing more reliable measurements; three measurements were taken to confirm the distances obtained (Quintal et al., 2004).

Discussion of the results

A higher percentage of indicators of premature facial ageing were confirmed in the group of mouth breathers, as well as a greater quantity of these signs per individual. However, the findings were not mentioned in the literature consulted.

The increase in tonus of the mental muscle in mouth breathers due to the attempt to promote lip closure is well documented in the literature (Tallgren et al., 1998; Vig, 1998; Di Francesco, 1999; Marins, 2001; Paulo e Conceição, 2003; Tessitore, 2004; Rodrigues et al., 2005). However, no significant presence of mental wrinkles was noted in these individuals.

The lower values of facial width in the mouth breathing group was unexpected, since according to Oliveira and Vieira (1999), facial flaccidness often occurs in this group. Individuals with facial flaccidness should therefore have larger distances between the buccinators than the subjects without this alteration (Jardini, 2005).

Higher dimensions of prominence of the nasogen sulcus to the tragus were observed in the control group than in the test group. However, larger differences were observed, between the right and left sides, in the group of mouth breathers, making higher facial disproportion evident in these individuals. These findings corroborate, in part, the study conducted by Paes (2004), where reductions in the differences in anthropometric measurements of these grooves were observed,

when both sides of the face were compared after speech therapy intervention in the pursuance of facial esthetics, with improvement in the symmetry and harmony of the face.

Conclusion

In the present study it was observed indicators of premature facial ageing in the group of mouth breathers when compared with the group of nasal breathers. It was observed more advanced stages of presence of dark shadows, wrinkles beneath the eyes and mental folds. In the mouth breathers it was observed faces a little bit more widened in the region of the cheeks and higher facial disproportion.

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